Ameren Exhibit 1.0

ILLINOIS COMMERCE COMMISSION

DOCKET No. 12-________

DIRECT TESTIMONY

OF

RICK L. FOSTER

Submitted On Behalf

Of

AMEREN ILLINOIS COMPANY
d/b/a Ameren Illinois

January 30, 2012

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I. INTRODUCTIONS AND WITNESS QUALIFICATIONS

Q. Please state your name, business address and present position.

A. My name is Rick L. Foster and my business address is 370 South Main Street, Decatur, Illinois 62523.

Q. By whom are you employed and in what capacity?

A. I am employed by Ameren Services Company ("Ameren Services" or "AMS') as a Consulting Engineer – Transmission Planning in the Transmission Policy and Planning Department. Ameren Services is the company that provides, among other services, engineering support for Ameren Illinois Company d/b/a Ameren Illinois ("AIC").

Q. Please summarize your educational background and professional experience.

A. I received the Bachelor of Science Degree in Electrical Engineering from the University of Missouri (Rolla Campus) in December of 1981. I received the Master of Science Degree in Electrical Engineering from the University of Missouri (Rolla Campus) in August of 1983. I received the Master of Business Administration Degree from Illinois State University (Contract Program in Decatur) in August of 2002. I am licensed as a Professional Engineer in the State of Illinois. I joined Illinois Power Company in 1983 as an engineer in the Planning Department. From 1983 to 1988, I performed engineering studies which often required the development or testing of new software programs to evaluate the reliable and economic operation of the generation, transmission and bulk supply system. From 1988 to 1995, I was responsible for developing, supporting and defending the company's least cost energy plan. From 1995 to 2000, I performed technical analysis to support the power marketing function including the mark-to-market calculations. In 2000, I moved to the transmission operations group where I was responsible for performing studies related to: transient stability, optimal reserve margin calculations, new generator interconnections, transmission reservation requests and daily support of the transmission system operators. I also participated on various MAIN (Mid-America Interconnected Network, Inc.) committees during this time performing various regional and inter-regional studies. In 2004, Illinois Power was acquired by Ameren at which time I became part of the Electric Planning Department, Transmission Planning Group. From 2004 to the present, I have performed various engineering studies regarding the performance and reliable expansion of the Ameren utility and inter-regional transmission system, the conceptual design of supplies to major customers, the system impact of interconnecting new generators, the analysis of major power system disturbances, the stability analysis of generating units connected to the Ameren transmission system and the adequacy of system reactive supply. I have served as Ameren's representative on several Southeast Electric Reliability Council (SERC) regional engineering committees and as chairman of the SERC Dynamic Review Subcommittee.

Q. What are your duties and responsibilities in your present position?

A. My responsibilities include performing various engineering studies regarding the performance and reliable expansion of the Ameren utility and inter-regional transmission system, the conceptual design of supplies to major customers, the system impact of interconnecting new generators, the analysis of major power system disturbances, the stability analysis of generating units connected to the Ameren transmission system and the adequacy of system reactive supply. In addition, I represent Ameren on several SERC engineering committees. These responsibilities encompass transmission facilities owned by the Ameren Illinois Company.

II. PURPOSE, SCOPE AND IDENTIFICATION OF EXHIBITS

Q. Are you familiar with the Project proposed in the Petition filed by AIC in this proceeding?

A. Yes. AIC is seeking a Certificate of Public Convenience and Necessity ("Certificate") authorizing it to construct a 138 kV electric transmission line (the "Transmission Line") in an area south and west of Champaign, Illinois, connecting the AIC Bondville Route 10 and Southwest Campus substations. Substation modifications at the Bondville Route 10, Southwest Campus and Windsor substations (which, together with the Transmission Line, constitute the "Project") will also be required. As AIC witness Mr. Murbarger explains, the Transmission Line consists of two non-contiguous transmission line segments ("New Segments") (totaling approximately 8.5 miles in length) connecting to an existing 1.48 mile 138 KV line segment currently classified as a distribution line (the "Existing Distribution Line"). My role in this project included the development and evaluation of transmission alternatives that would support the existing load as well as the future load growth in the Champaign area.

Q. Is AIC seeking expedited approval of the Certificate?

A. Yes. Section 8-406.1 of the Public Utilities Act [220 ILCS 5/8-406.1] allows a utility to apply for a Certificate of Public Convenience and Necessity for a new high voltage electric transmission line under an expedited 150 day procedure.

Q. Has AIC complied with all the provisions of Section 8-406.1 requiring additional information to support this Petition?

A. Yes. Subsections 8-406.1(a), (d), and (e) contain requirements regarding information a utility must include in its application or publish in an official State newspaper or on a dedicated Internet website. AIC has provided the required information as explained in its Petition. In addition, I have attached a checklist to facilitate the verification that AIC has provided all the required information under Section 8-406.1 as Ameren Exhibit 1.21. As Ameren Exhibit 1.21 indicates, the information required under Section 8-406.1 has been provided in the direct testimony and exhibits submitted by AIC.

Q. What is the purpose of your testimony in support of this Petition?

A. I provide an overview of the present and future electric service needs in the area served by the transmission system located in Champaign County, Illinois and to explain the planning undertaken to meet those needs. My testimony will cover four topics. First, I will discuss the design of the AIC electric delivery system. Second, I will describe the existing facilities used to supply the Project Area. Third, I will outline the system reinforcement needs of the area. Fourth, I will present AIC's plan for a new 138 kV electric line to meet those needs, as well as for substation modifications at the Bondville Route 10, Southwest Campus and Windsor substations.

Q. Please summarize why this project is necessary to provide adequate and reliable service.

A. This project is needed to prevent widespread outages and loss of electric service in the Champaign area due to credible coincident outages of transmission elements. There is approximately 440 MW of load at risk. This amount of load exceeds the 300 MW threshold prescribed by AIC’s transmission planning criteria filed with FERC and thus requires mitigation.

Q. In addition to your testimony are you sponsoring any other exhibits?

A. Yes. I am sponsoring the following exhibits: NERC standard TPL-002-1b as Ameren Exhibit 1.1; the NERC standard TPL-003-0 as Ameren Exhibit 1.2; Ameren’s Transmission Planning Criteria and Guidelines as Ameren Exhibit 1.3; a map of the Champaign area showing the existing transmission and subtransmission lines as Ameren Exhibit 1.4; an electrical one-line of the Champaign area illustrating the transmission and distribution facilities as Ameren Exhibit 1.5; a table displaying the capacities of the existing Champaign area transmission and subtransmission lines as Ameren Exhibit 1.6; a table displaying the capacities of the existing Champaign area transmission and subtransmission transformers as Ameren Exhibit 1.7; the Champaign area weather normalized load forecast based on 2008, 2009 and 2010 actual loads as provided Ameren Exhibits 1.9, 1.10 and 1.11. In addition, I am submitting four powerflow diagrams to better describe the Champaign area transmission and subtransmission system during normal and contingency conditions. The diagram showing the expected 2015 summer powerflow results with all transmission facilities in service is included as Ameren Exhibit 1.8. Three diagrams showing the 2015 summer powerflow results under contingency conditions that result in unacceptable AIC system performance are included as Ameren Exhibits 1.12, 1.13 and 1.14. Ameren Exhibit 1.15 shows a map of the Champaign area with the proposed Transmission Line. Powerflow diagrams presented in Ameren Exhibits 1.16, 1.17 and 1.18 demonstrate that the proposed Transmission Line, in conjunction with the substation modifications at the Southwest Campus, Windsor and Bondville Route 10 Substations, will significantly improve the ability of the Ameren delivery system to serve Champaign area loads. A list of the correspondence with the Midwest ISO pertaining to the Project is provided in Ameren Exhibit 1.19. Ameren Exhibit 1.20 contains a study of the Champaign area transmission system and the various alternatives considered in the development of a long-term plan to serve load in the area. I am also sponsoring Ameren Exhibit 1.21 as described above.

III. <u>ELECTRIC SYSTEM DESCRIPTION</u>

Q. Please explain how the AIC transmission and distribution system delivers electricity to customers.

A. AIC considers its electric delivery system as being comprised of three functional levels for planning and operating purposes: 1) transmission (345 kV, 230 kV, 161 kV and 138 kV); 2) subtransmission (69 kV and 34.5 kV); and 3) distribution (12 kV and 4 kV). Each of these systems has unique design and operating characteristics. The transmission system is a network of higher voltage lines which is used to move electric power from the generation sources to the distribution systems and to move electric power between utility systems. A limited number of very large customers and distribution substations are served directly from the transmission system. The subtransmission system includes both network and radial 69 kV and 34.5 kV lines. Bulk supply transformers supply electricity from the transmission system to the subtransmission system, which in turn delivers power at the intermediate voltage levels to distribution substations or directly to large customers. Distribution substation transformers step the subtransmission voltages down to the 12 kV and 4 kV distribution system voltages. The distribution system is predominantly configured as a radial system.

Q. Please explain the two major transmission system voltages in AIC's service territory.

A. The two transmission voltages most often utilized in the AIC system are 345 kV and 138 kV. The 345 kV network is the backbone of the AIC transmission system and is the most common high voltage network in the Midwestern United States, where it is used for major transmission interconnections. The 345 kV network connects to large base loaded power plants and is designed to move large quantities of power from these plants to major load centers and to neighboring power systems. The 138 kV network is considered a local transmission system as it connects to smaller power plants and moves the power from these plants and the 345 kV network to the bulk distribution and customer substations within the major load centers.

IV. ELECTRIC PLANNING

Q. What factors must be considered in developing, operating and maintaining an adequate, efficient, and reliable transmission (and subtransmission) system?

A. The transmission, subtransmission and distribution systems are planned and designed to supply all loads during peak load conditions. AIC, through Ameren Services, follows established NERC Standards TPL-002-1b and TPL-003-0 provided in Ameren Exhibits 1.1 and 1.2 as well as Ameren's Transmission Planning Criteria and Guidelines provided in Ameren Exhibit 1.3. These transmission planning criteria are applied to ensure the development of a system which will adequately and reliably serve the projected customer loads as well as meet its obligations to its transmission service customers.

The transmission system is planned to supply the forecasted load, without violating thermal loading and voltage limits during normal and contingency outage conditions. The system is planned to allow continued operation during the outage of any single generating unit or transmission facility. In addition, with any one generator out of service, the system is planned to operate with all equipment loaded at or below its emergency rating and voltages within acceptable limits during the outage of any one transmission facility.

AIC's transmission planning criteria also guards against the exposure to loss of a significant amount of customer load for the concurrent outage of any two transmission elements. AIC's transmission planning criteria parses the loss of customer load for the concurrent outage of any two transmission elements (NERC TPL-003-0 contingency events) into two categories. In the first category, load is shed in a controlled manner via automatic or operator initiated actions to keep the loadings and system voltages within established limits. In the second category, the supply to a defined pocket of load is lost as a direct consequence of the system topology and/or natural response of the system. For the first category, the AIC planning criteria requires mitigation if the amount of load to be shed in a controlled manner exceeds 100 MW. For the second category, the AIC planning criteria requires mitigation if the amount of load exposed to being dropped for more than 15 minutes due to the system topology and/or the natural response of the system exceeds 300 MW.

The subtransmission system is likewise planned to supply the forecast load at peak load conditions and the performance of the system is evaluated for single contingency outage conditions. Load supplied by a radial line will be dropped during outages of that line. If load has to be dropped or left out-of-service as the result of a contingency on the subtransmission system, system improvement projects are considered to minimize future risk of load being out-of-service.

In all cases, the system is planned, designed and operated to maintain adequate voltage to the customers. The system is also planned to avoid thermal overload of equipment and minimize the likelihood of catastrophic equipment failure, voltage collapse and widespread service outages. The higher voltage lines have greater load carrying capability and can deliver power over greater distances more efficiently with less energy loss and less voltage drop than lower voltage lines. As a result, extending transmission facilities close to the load minimizes energy losses and improves the delivery voltage.

Q. Why do you study contingency conditions as well as normal operating conditions?

A. Planning for contingencies recognizes that system disturbances and equipment failures are inevitable. The effects of these contingency conditions on the system must be evaluated and considered when determining the need for system reinforcement plans. The goal is to provide reliable electric service at a reasonable cost. Contingency planning is commonly used throughout the electric utility industry. In addition, North American Electric Reliability Corporation ("NERC") reliability standards require that the bulk electric system be planned so as to be able to withstand specified contingency events.

Q. Please explain how you determine that a plan has the capacity to meet the projected demand for electricity while providing adequate voltage to the customers.

A. An engineering analysis is performed to verify that a plan can meet the projected demand for electricity within the thermal loading capability of the delivery facilities while providing adequate voltage to the customers. The analysis utilizes computer software that evaluates the operation of the system under expected normal system conditions, all components in service, and under contingency conditions. The electric loading on each component is evaluated relative to its thermal rating to ensure there are no overloads at projected peak loads under these conditions. System voltages are also examined to ensure that adequate voltage levels are maintained.

Q. Please outline the voltage criteria used to identify low voltage conditions.

A. The voltage criteria used by AIC transmission system planning has been developed to provide voltages to the customer consistent with the 83 Illinois

Administrative Code Part 410 Standards of Service for Electric Utilities. The distribution system planning criteria sets maximum and minimum steady state voltage limit guidelines at the low voltage bus of distribution and customer substations and at 34.5 kV and above customer delivery points for normal and contingency conditions. Voltages below these limits are investigated to ensure adequate voltage will be maintained on the distribution feeders. A low voltage limit of 95% of nominal has been established on the transmission system with due consideration of the above voltage requirements for the subtransmission and distribution systems. Voltages below this threshold would initiate a discussion with the distribution system planner to ensure that adequate distribution voltages would be maintained under both normal and single contingency conditions.

For conditions beyond single contingencies, transmission voltages below 90% would be investigated further to determine what actions, if any, are required so that these contingencies would not result in widespread outages or voltage collapse. These investigations would consider the voltage impact of line faults before the load tap changing transformers could respond. It should be noted that 85% is the level at which a voltage collapse is essentially assured. Conditions which result in 86% - 89% voltages in the steady-state analysis carry significant risk for voltage collapse.

Q. Does AIC regularly assess the adequacy of existing facilities to transmit and distribute power to customers?

A. Yes. Ameren Services as the agent for AIC regularly evaluates projected system conditions relative to the AIC transmission planning criteria to ensure that the performance of AIC's transmission system meets the requirements of the NERC planning standards. Assessments of the transmission system are performed annually to meet the NERC standards based on the latest available system and substation load forecast information, generation capacity and control information, transmission network impedance topology, and interchange assumptions. The assessments seek to identify projected transmission facility loadings or voltages outside of established limits during both normal and contingency conditions. Corrective action plans are then developed to ensure that AIC's transmission system performance meets the performance requirements of the NERC standards.

The results of these various assessments provide an indication of when and to what extent system reinforcement is needed. Deficiencies in transmission system performance qualify for system reinforcement. The assessments and corrective action plans provide the basis for transmission system upgrades that would be included in the construction budgets of AIC.

Q. What actions are taken based upon such an assessment?

A. When projected performance deficiencies are identified, a detailed system study is initiated to determine and evaluate alternatives and develop a recommended plan.

Q. What is the time frame over which transmission, subtransmission or distribution plans are studied?

A. Transmission, subtransmission and distribution plans typically cover a time period of at least ten years into the future and include a detailed five year construction plan and horizon strategy. Major transmission and other electric delivery service infrastructure projects have a construction lead time of several years. Thus, transmission planning must study projected loads several years into the future and determine where transmission or other infrastructure projects are needed to allow sufficient time for planning and construction of new facilities.

V. <u>ELECTRIC SUPPLY TO PROJECT AREA: EXISTING AND PROPOSED</u>

Q. Please describe the facilities which provide electric service to the Project Area south and west of Champaign, Illinois.

A. Ameren Exhibits 1.4 and 1.5 are drawings of the Champaign area showing the electrical delivery system which provides electrical supply to the local loads. Ameren Exhibits 1.6 and 1.7 show the capacities of the lines and transformers that support the Champaign area load. Ameren Exhibit 1.8 displays the power flows and voltages in the Champaign area with all facilities in service. These power flows incorporate the automatic load tap changing capability of the bulk supply transformers and the impact of all the capacitor banks available at both the subtransmission and distribution voltage levels. The Champaign area is supplied by five 138 kV lines. Two 138 kV lines supply the area from the Sidney Substation. The Sidney Substation presently contains a single 345/138 kV transformer (a second one is planned to be in service by the summer of 2013 and is included in the power flow model) and provides about 74 percent of the summer peak real power flow into the Champaign area with all facilities in service. Two 138 kV lines supply the area from the Rising Substation. The Rising Substation contains a single 345/138 kV transformer and provides about 17 percent of the summer peak real power flow into the Champaign area with all facilities in service. One 138 kV line supplies the area from the Vermilion Switchyard. The Vermilion Switchyard provides about 9 percent of the summer peak real power flow into the Champaign area with all facilities in service. Presently there are bulk supply transformers at the North Champaign, Mira, Southwest Campus and Bondville Route 10 substations. The North Champaign Substation contains two bulk supply 138/69 kV transformers and is supplied by three 138 kV transmission lines. The Southwest Campus Substation contains two bulk supply 138/69 kV transformers but is supplied by only one 138 kV transmission line. Both Mira and Bondville Route 10 substations contain one bulk supply 138/69 kV transformer and are supplied by one 138 kV transmission line. The Champaign 69 kV system is operated as a networked system.

Q. How long has it been since the Project area had a major electrical upgrade?

A. A 3.25 mile, 138 kV line between the Rising and Bondville Route 10 substations was completed in December of 2006. This line was built to provide a transmission supply to the Bondville Route 10 Substation which supplies the area to the west of Champaign. At the time, it was envisioned that a second line would be constructed from this substation to another substation providing a networked transmission connection. The Transmission Line is discussed in the direct testimony of Martin J. Hipple in Docket No. 06-0083 as follows:

> Provisions have been made to allow for a future 138 kV loop connecting the 138 kV source at the Rising Substation to the Southwest Campus Substation. The existing plan to connect Rising Substation to the Bondville Route 10 Substation site is the first segment of the loop, which would ultimately extend to the Southwest Campus Substation, completing the 138 kV loop around the southwest quadrant of the Champaign area. This ultimate configuration will result in dual source capability into the

> Southwest Campus Substation, resulting in increased reliability and increased voltage support during certain single contingency conditions on the transmission system.

The Transmission Line in this proceeding is the "future 138 kV loop" referred to by Mr. Hipple in that Docket.

Q. Is load expected to increase in the Champaign area?

A. Yes. The most recent forecast for the Champaign area is presented in Ameren Exhibit 1.11. This forecasted load is based on 2010 actual peak loads of 505 MW for the area. For comparison purposes, the previous two forecasts for the Champaign area are provided in Ameren Exhibits 1.9 and 1.10. It can be seen that the actual loads have been increasing over the past few years. The load forecast shown in Ameren Exhibit 1.11 for the Champaign area shows an annual load growth rate of 2.6 percent. This value is a composite of three components, Distribution (comprised of residential and small commercial customers), Large Customers (typically large commercial and industrial customers with peak loads greater than 1 MW) and REA/Other (typically wholesale customers) loads. An example of a large customer load addition is the University of Illinois. They are adding 42 MW between 2009 and 2015 as they complete the new Blue Waters facility, build new data centers and experience campus growth.

Q. What is the current load forecast for the Champaign area?

A. Based on the forecasted 2015 summer conditions, the weather normalized non-coincident peak for the Champaign area is expected to be approximately 624 MW as shown in Ameren Exhibit 1.11. The coincident summer 2015 peak load for the Champaign area is expected to be around 568 MW. Presently 15.8 MW of Monticello load and 19.4 MW of Danville load is served from the Champaign 69 kV system. These loads can be transferred to Decatur and Danville area sources respectively to reduce the loading on the Champaign area. For the power flow analysis performed to support the proposed Transmission Line, these loads have been transferred. The analysis of 2015 conditions assumed a coincident summer peak load for the Champaign area of 552 MW.

Q. Has AIC assessed the electrical supply system serving the Champaign area?

A. Yes. AIC has been reviewing the need for system upgrades or operational solutions throughout its service area, including the Champaign area, since Ameren purchased the facilities of Illinois Power. These reviews have followed the planning and assessment process discussed above. A very detailed study of the Champaign area was performed immediately after the Ameren purchase of Illinois Power to address concerns expressed by the City of Champaign. Recent studies have been conducted to review the impacts of new load being added in the Champaign area. The transmission studies performed included a detailed representation of the underlying 69 kV system.

Q. Please summarize the results of this study process.

A. A contingency analysis was performed for forecasted 2015 summer peak load conditions as prescribed by the NERC planning standards and the AIC transmission planning criteria, where both single and multiple outages of transmission elements were evaluated. Examples of problematic contingencies that will likely result in the voltage collapse of the Champaign 69 kV system are presented in Ameren Exhibits 1.12 through 1.14. In these exhibits, buses that experience voltages of 86 percent or less are shown in red and facilities that exceed their emergency thermal rating are shown in orange.

Ameren Exhibit 1.12 shows that voltages at numerous locations through the Champaign area dropped well below the 86 percent level for the concurrent outage of the Sidney to Mira to North Champaign and the Sidney to Southwest Campus 138 kV lines. For the simultaneous outage of the two transmission lines, the effect of load tap-changing transformers was not included since they cannot respond quickly enough to prevent the voltage from collapsing. Due to the widespread nature and severity of the low voltages, voltage collapse is expected under this scenario. Since the two lines share a corridor as they leave the Sidney Substation and proceed along parallel paths to the Champaign area, the coincident outage of both lines is a very realistic scenario.

Ameren Exhibit 1.13 shows the powerflow results when the Sidney to Southwest Campus 138 kV line is faulted when the Rising 345/138 kV transformer is out of service. Transformer outages tend to be longer in nature as it requires a significant amount of time to move the large replacement transformer to the desired location. The probability of a line fault during this outage increases the exposure of concurrent outages. In this scenario, the load tap changing transformers were allowed to move after the transformer outage but not after the line outage. It can be seen from the power flow diagram that the voltages fell below 86% at several locations. Since the low voltage locations are central to the 69 kV system, the probability of collapse is likely. The probability will increase as the loads in the area grow.

Ameren Exhibit 1.14 displays the powerflow results when the Sidney to Southwest Campus 138 kV line is faulted when the North Champaign 138/69 kV Transformer #3 is out of service. Transformer outages tend to be longer in nature as it requires a significant amount of time to acquire and move the large replacement transformer to the desired location. The probability of a line fault during this outage increases the exposure of concurrent outages. In this scenario, the load tap changing transformers were allowed to move after the transformer outage but not after the line outage. The power flow results indicate that low voltages will occur across the entire Champaign 69 kV system. The voltages dropped significantly below 86 percent and will most likely lead to voltage collapse. Since this transformer is an older model the probability of failure is higher and thus the likelihood of this scenario is greater.

Q. What are the system reinforcement needs for the Project area?

A. Based on the contingency analysis, it is clear that a second transmission source is needed at the Southwest Campus Substation. Long term studies also indicate the need for a second transmission source to the Bondville Route 10 Substation. Therefore, transmission plans designed to maintain an adequate voltage support to the Champaign area should consider additional transmission support to both substations. This will allow the full utilization of the bulk supply transformer redundancy at the Southwest Campus Substation. It will also prevent the loss of two bulk supply transformers for a single transmission contingency. A second transmission supply to the Southwest Campus Substation would also allow the existing transmission supply line to be taken out of service for required maintenance. Given there is a predominant concentration of load growth in the area south and west of Champaign, it also desired to provide a second transmission source to the Bondville Route 10 Substation. A new 138 kV transmission line between the Southwest Campus Substation and Bondville Route 10 Substation provides a second transmission supply line to both substations. New 138 kV breakers and ring-buses at both substations will also ensure that the transmission supply is maintained under single transmission contingency conditions. The proposed Transmission Line is presented in Ameren Exhibit 1.15.

The contingencies examined in Ameren Exhibits 1.12 through 1.14 were revisited after the addition of the Transmission Line. Ameren Exhibit 1.16 provides the power flow results for the concurrent outage of the Sidney to Mira to North Champaign and the Sidney to Southwest Campus 138 kV lines after the Transmission Line is added. Under this contingency scenario there are now no voltages below 91% and no transmission or subtransmission facilities loaded beyond their emergency rating. Ameren Exhibit 1.17 contains the power flow results for the concurrent outage of the Rising 345/138 kV transformer and the Sidney to Southwest Campus 138 kV line after the Transmission Line is added. For this contingency scenario, there are now no voltages below 89% on Champaign 69 kV system or subtransmission facilities loaded beyond their emergency rating. The two voltages below 89% are located at distribution substations served directly from the transmission system. Loss of load at these locations is expected to be minimal and contained to small areas of the system. Ameren Exhibit 1.18 illustrates the power flow results for the concurrent outage of the North Champaign 138/69 kV Transformer #3 and the Sidney to Southwest Campus 138 kV line after the Transmission Line is added. Consideration of this contingency scenario indicates that there are now no voltages below 94%. These exhibits show that the Transmission Line provides a significant improvement in post contingent voltages and substantially reduces the possibility of voltage collapse.

Q. Please describe how the electrical supply to the Project area will change with the addition of the new 138 kV line.

A. As shown in Ameren Exhibit 1.15, a new 138 kV line is proposed to be constructed between the existing Southwest Campus Substation and the Bondville Route 10 Substation via the Windsor Substation. The existing 138 kV transmission line will be routed directly into the Southwest Campus Substation with the connection to Windsor Substation via the Existing Distribution Line removed. A new six breaker ring-bus will be constructed in the Southwest Campus Substation to assure that a single contingency will not outage more than one bulk supply transformer. Also a three breaker ring-bus will be constructed in the Bondville Route 10 Substation to maintain a transmission supply under single contingency conditions. Minor modifications and upgrades will also be made at the Windsor Substation to allow remote line switching to pick up load that may otherwise remain out of service. Initially the normal summer peak flow on the new 138 kV line is expected to be around 43 MVA. Contingency flows could be as high as 94 MVA.

Q. Please summarize the planning parameters of the new line.

A. The new line will have an operating voltage of 138,000 volts or 138 kV. Each new section of line will be designed to carry 2000 amps under summer operating conditions.

Q. How will the addition of the new 138 kV line improve the reliability of the distribution system in Project Area?

A. The new 138 kV line will improve the reliability of the distribution system and support both near and long term load growth in the area. It will connect two existing radial 138 kV lines resulting in a more robust system. The existing Rising to Bondville Route 10 and Sidney to Southwest Campus 138 kV lines will no longer be operated as radial lines but as part of the networked transmission system. This networked system will provide a second transmission supply line for both the Southwest Campus and Bondville Route 10 138/69 kV bulk supply substations. The new line and circuit breaker additions at the Southwest Campus Substation will prevent a single contingency from removing more than one bulk supply transformer from service. It will also ensure that a transmission path is available to the North Champaign, Bondville Route 10 and Southwest Campus bulk supply substations from both the Sidney and Rising substations for the outage of any single transmission line.

The new line will minimize the probabilities for heavy flows across the Champaign 69 kV system causing thermal overloads and low voltages. Based on powerflow modeling and simulations, the new line will provide additional voltage support so that credible outage scenarios involving the loss of two transmission elements should not lead to voltage collapse in the Champaign area. The new line will allow the system operators to remove any one of the bulk supply transformers for extended periods of time without jeopardizing the reliability of the electric supply to the Champaign area. With the second transmission supply to the Southwest Campus Substation, the source to the South Savoy Substation can be switched from the Northeast Tuscola Substation to the Southwest Campus Substation, thus reducing the exposure to outages on a long 69 kV line from Tuscola. Presently the Savoy 12 kV distribution circuits cannot be switched during an outage condition involving either the Savoy or South Savoy substation because the Champaign and Tuscola 69 kV sources are out of phase.

Q. Has there been communication between AIC and the regional transmission organization regarding this project?

A. Yes. Ameren Services provides information to the regional transmission organization ("Midwest ISO") periodically regarding Ameren's plans for upgrades and additions to Ameren's transmission system. This effort includes an annual list of Ameren Service's plans for upgrades and additions. Also, as part of compliance with FERC Order 890, the Midwest ISO and the Transmission Owners in the Midwest ISO hold Subregional Planning Meetings multiple times each year. Information on planned upgrades and additions to the transmission system is presented at these meetings. Ameren Services provides information to the Midwest ISO to be presented at these meetings on each planned project. The information is compiled in the form of PowerPoint slides. Ameren Exhibit 1.19 summarizes this information in regards to the proposed Transmission Line. The project was included in three Midwest ISO presentations prepared for the Subregional Planning Meetings. In addition, three emails were sent to the Midwest ISO describing the Project or clarifying various aspects of the Project.

Q. Please describe Midwest ISO's role in the determination of the need for the Transmission Line.

A. Typically the Midwest ISO does not participate in local area studies such as the Champaign area study. While the Midwest ISO did not play a role in the determination of the need for the proposed plan, the project is included in their 2011 transmission expansion plan and is listed in Appendix A with project identification number 2992. This project was submitted to the Midwest ISO by Ameren Services as a planned project. It was approved by the Midwest ISO Board of Directors and added to their Appendix A project list. Appendix A contains all the planned projects that MISO includes in the development of the base power flow models that are used for future study purposes. The Midwest ISO has determined that the Transmission Line is not a base-line reliability project or a merchant line and thus not eligible for cost-sharing. While the Transmission Line is a reliability project, it is viewed as a local reliability project and not one that address system constraints identified by MISO. Incremental revenue requirements will be recovered from all retail and wholesale customers in the MISO Ameren Illinois pricing zone. The new line will be included in the AIC Attachment O rate calculation and recovered from wholesale and unbundled retail customer through the Schedule 9 NITS charge. Bundled retail customers will pay their share through Rider TS.

Q. Did AIC explore other alternatives to improve electric supply to the Project area?

A. Yes. AIC explored four alternatives to the preferred plan. These alternative plans along with the preferred plan are described in detail in the Champaign Area Transmission Study presented in Ameren Exhibit 1.20. This report discusses the upgrades required by each plan and the estimated cost to implement the plan. The alternatives are: (1) a new 138 kV line between the North Champaign and Southwest Campus substations and between the Rising and Bondville substations; (2) a new 138 kV line between the Rising and the Southwest Campus substations via the Bondville Substation; (3) a new 138 kV line between the Mira and Southwest Campus substations and between the Rising and Bondville substations; and (4) a new 138 kV line between the Sidney and Southwest Campus substations. Each of these plans was developed such that they would successfully mitigate the potential for voltage collapse in addition to any local voltage or thermal constraints for single and multiple contingencies. A detailed analysis of these alternatives was performed under 2021 summer forecast peak conditions. The study concluded that the Project was the preferable plan based on the costs, constructability constraints, availability of existing facilities and right-of-ways and potential for meeting long-term future growth in the Champaign area.

A mitigation plan that consisted solely of distribution and transmission substation upgrades was developed and tested under contingency conditions. This plan failed to successfully mitigate the potential for voltage collapse.

Q. Was Demand-Side Management considered?

A. AIC presently employs a number of incentives at both the residential and commercial level to encourage energy efficiency. Any reductions in load as a result of these incentives have already been figured into distribution load projections, which in turn have been used as the basis for the powerflow simulations of system conditions that indicate the need for the proposed transmission project

Q. Was a Present Value Revenue Requirement comparison performed for these alternatives?

A. No. A Present Value Revenue Requirement comparison was not completed for the alternatives because the in-service date for each of the alternative transmission projects would be essentially the same. Therefore, a comparison of the costs between the various alternatives was done based on comparing capital costs. It is not envisioned that any events would occur that would cause a different alternative to become more economical than the alternative selected.

Q. Why is reliance on reactive supply additions insufficient?

A. The immediate concern for the Champaign area is maintaining adequate voltage at the distribution substations immediately after transmission outages and before the load tap changing transformers can respond. Since the var output of capacitor banks is proportional to the voltage squared, an over reliance on capacitors could lead to faster voltage collapse during transmission outages. The existing Champaign area 69 kV network has approximately 68 Mvar of 69 kV capacitor bank capacity installed across the system to offset the reactive load requirements. AIC installed a 14.4 Mvar bank at the Bondville Substation in 2010 and plans to add 28.8 Mvar at the North Champaign Substation, 14.4 Mvar at the Southwest Campus Substation and 10 Mvar at the Windsor Substation to relieve the bulk supply transformer reactive power loading and maintain area voltages during transmission outages. Review of actual peak loads in 2009 indicates that the 69 kV network in the Champaign area is maintained at a 0.98 power factor, which is an appropriate level of reactive compensation.

The possibility of installing static var compensators was considered. Analyses determined that this is not a workable solution. The addition of about 100 Mvar of static var compensators would improve system voltages in the event of the simultaneous outage of two elements, but some facilities would be loaded far above their emergency thermal rating (up to 200%). A cascading outage would occur; with the end result that an area involving more than 300 MW would experience a loss-of-service event.

Q. What has AIC concluded regarding system improvements in the Project area?

A. AIC has concluded that expected load growth in the Champaign area requires additional transmission support at both the Southwest Campus and Bondville Route 10 Substations. Distribution upgrades would not be effective in mitigating the potential for voltage collapse in the Champaign area. AIC determined that a new 138 kV line would be necessary to provide this voltage support. Construction of the Transmission Line, therefore, will ensure continued reliable service to customers within the Champaign area and contributes toward compliance with NERC Reliability Standards and AIC transmission planning criteria.

Q. Does AIC anticipate further system improvements will be needed in the Champaign Area in the next ten years?

A. Yes. In the next ten years, several additional transmission facilities will be needed to mitigate the potential for voltage collapse in the Champaign Area. The 2011 Midwest ISO expansion plan includes a new Sidney to Rising 345 kV line as a multi-value project. This transmission line along with a new 345/138 kV transformer on the west side of Champaign will be needed to maintain the integrity of the transmission system supply under credible multiple contingency conditions. It is expected that the new transformer will connect to the new Southwest Campus to Bondville 138 kV line thus providing additional support to both the Bondville Route 10 and Southwest Campus substations.

Q. Will any existing facilities be removed and not utilized after the installation of the proposed line?

A. No. No significant facilities will be retired due to the installation of the Transmission Line. Various upgrades will be implemented at the Bondville Route 10, Windsor and Southwest Campus substations. Existing equipment such as switches, string bus conductor, circuit switchers, structures, etc. will be upgraded or replaced in these substations. These substations are shown in Ameren Exhibit 1.15.

Q. Does the current economic situation impact the need for the new Transmission Line?

A. At this time, AIC does not believe that the current economic situation impacts the need for this line. While some smaller area businesses have closed and some residents may have moved as a result of the economic downturn in the Champaign area, AIC is also aware that a number of customer load expansions are planned and are expected to progress in the Champaign area. A large subdivision on the northwest side of Champaign is currently being developed called “Clear View.” The City of Champaign has targeted the new interchange at I-57 and Curtis Road for commercial development. Champaign downtown redevelopment is underway. There is a proposed load addition by a large customer in Urbana that could result in greater than 10 MW of new load. The University of Illinois is committed to expanding their facilities as they open the Blue Waters facility and anticipate building a new data center.

Q. What is the timeframe for completion of the Transmission Line?

A. The planned in service date for the Transmission Line is June 1, 2015. This date was arrived at by considering the Champaign area load that would stress the system such that voltage collapse would likely occur under multiple contingency conditions. A comparison of this level of load with the latest forecast for the Champaign area led to the decision to target an in-service date prior to the 2015 summer peak. The Midwest ISO did not provide input into this decision since the focus is on maintaining adequate service to a local load area. If the in-service date is delayed, the probability of a voltage collapse and loss of the entire Champaign area load will increase since the time the load will exceed the critical levels will be longer. In addition, AIC will not be able to meet the criteria specified in its FERC-filed transmission planning criteria.

VI. <u>CONCLUSION</u>

Q. Does this conclude your prepared direct testimony?

A. Yes, it does.